claims are to be understood as being modified by the term "about." Accordingly, unless otherwise indicated, implicitly or explicitly, the numerical parameters set forth are approximations that may depend on the desired properties sought and/or limits of detection under standard test conditions/methods. When directly and explicitly distinguishing embodiments from discussed prior art, the embodiment numbers are not approximates unless the word "about" is recited.

In view of the many possible embodiments to which the principles of the disclosed invention may be applied, it should be recognized that the illustrated embodiments are only preferred examples of the invention and should not be taken as limiting the scope of the invention. Rather, the scope of the invention is defined by the following claims. We therefore claim as our invention all that comes within the scope and spirit of these claims.

We claim:

1. A separation process comprising:

(a) providing an ionic liquid catalysis reaction mixture including an ionic liquid, an unreacted sugar compound, and a predetermined reaction product of an ionic liquid catalysis reaction;

(b) flowing the ionic liquid catalysis reaction mixture into a first vessel having a solid porous adsorption material having an adsorption affinity for the predetermined reaction product;

(c) collecting separated ionic liquid and unreacted sugar compound eluting from the first vessel;

(d) desorbing the predetermined reaction product from the solid porous adsorption material in the first vessel with a fluid flow stream; and

(e) collecting the desorbed predetermined reaction product eluted with the fluid flow stream.

2. The separation process of claim **1** wherein the predetermined reaction product of an ionic liquid catalysis reaction is HMF, C5-C6 molecules of an aromatic ring compound of dehydrated sugar molecules and/or de-oxygenated sugar molecules an HMF derivative, or mixtures thereof.

3. The separation process of claim **1** wherein the predetermined reaction product of an ionic liquid catalysis reaction is HMF.

4. The separation process of claim **1** wherein the ionic liquid acts as both a solvent and a catalyst in an ionic liquid catalysis reaction.

5. The separation process of claim **1** wherein the ionic liquid is triisobutyl(methyl)phosphonium tosylate and/or 1-ethyl-3-methylimidazolium chloride.

6. The separation process of claim **2** wherein the ionic liquid is triisobutyl(methyl)phosphonium tosylate and/or 1-ethyl-3-methylimidazolium chloride.

7. The separation process of claim **1** wherein the solid porous adsorption material comprises zeolite.

8. The separation process of claim **1** wherein the solid porous adsorption material comprises one or more of carboxen 1012, organophilic zeolite, molecular sieve, pinnacle II phenyl bulk packing, carboxen 1003, porous silica, carboxen 1021, carbon black, carbopack X, MCM-41, PLC-18, DWNTS, synthetic hydrotalcite, amberlite XAD-1180, pinnacle II amino bulk packing, pinnacle II cyano bulk packing, BCR-704, amberlyst 16 wet, activated charcoal, dowex monosphere 99ca/320,1, phenyl-functionalized silica gel.

9. The separation process of claim **1** wherein the solid porous adsorption material comprises one or more of activated carbon, graphitized carbon black, or carbon molecular sieve, the solid porous adsorption material having a mean pore size of 1 nm to 5 nm.

10. The separation process of claim **1** wherein the solid porous adsorption material comprises carbon black, the solid porous adsorption material having a surface area of 500 m^2/g or greater and a mean pore size of 1 nm to 5 nm.

11. The separation process of claim **1** wherein the solid porous adsorption material comprises zeolite of MFI-type lattice structures of Si/Al ratio of at least 10 having a silicon to aluminum ratio of greater than 10 and having a MFI-type lattice structure ion exchanged with alkaline, alkaline earth metal ions or mixtures thereof.

12. The separation process of claim **1** wherein the solid porous adsorption material is zsm-5 zeolite, silicalite zeolite, silicalite-1 zeolite of crystal sizes from 10 nm to 300 nms.

13. The separation process of claim **1** wherein the solid porous adsorption material is zeolite faujasite having a silicon to aluminum ratio of from 2 to 100.

14. The separation process of claim **1** wherein the solid porous adsorption material comprises silicalite zeolite, and/or silicalite-1, that are substantially free of aluminum.

15. The separation process of claim **1** wherein the unreacted sugar compound is fructose or glucose.

16. The separation process of claim **1** further comprising mixing the ionic liquid catalysis reaction mixture with de-ionized water to make a water solution mixture, and flowing the water solution mixture into the first vessel.

17. The separation process of claim **1** wherein the ionic liquid catalysis reaction mixture comprises 0.1% to 99% ionic liquid, 0% to 95% water, 0.1% to 29% unreacted sugar compound, and 1 to 50% of the predetermined reaction product.

18. The separation process of claim **17** wherein the predetermined reaction product is HMF.

19. The separation process of claim **1** wherein the ionic liquid catalysis reaction mixture is flowed in the first vessel having a solid porous adsorption material comprising adsorbent particles with a mean particle size of 0.1 mm to 10 mm, at a liquid-hourly space velocity of 0.1 to 100 1/h through the first vessel.

20. The separation process of claim **1** wherein the solid porous adsorption material is structured in the first vessel to form an array of parallel flow channels and flowing the ionic liquid catalysis reaction mixture through the parallel flow channels of the first vessel at a liquid-hourly space velocity of 0.1 to 100 1/h.

21. The separation process of claim **19** wherein the solid porous adsorption material comprises adsorbent particles with a mean pore size of 0.1 mm to 3 mm.

22. The separation process of claim **1** wherein the fluid flow stream comprises water, methanol, ethanol, liquid-phase CO_2 or mixtures thereof.

23. The separation process of claim **1** wherein the fluid flow stream comprises alcohol.

24. The separation process of claim **1** wherein desorbing the predetermined reaction product from the solid porous adsorption material in the first vessel first comprises flowing an inert gas through the first vessel, purging residual solution from the first vessel, and then desorbing the predetermined reaction product from the solid porous adsorption material with a second fluid flow stream in the first vessel.

25. A separation process comprising:

(a) providing an ionic liquid catalysis reaction mixture including HMF, triisobutyl(methyl)phosphonium tosylate, and an unreacted sugar compound;

(b) mixing the ionic liquid catalysis reaction mixture with de-ionized water to make a water solution mixture;

(c) flowing the water solution mixture into an adsorption material column packed with particles of one or more of